



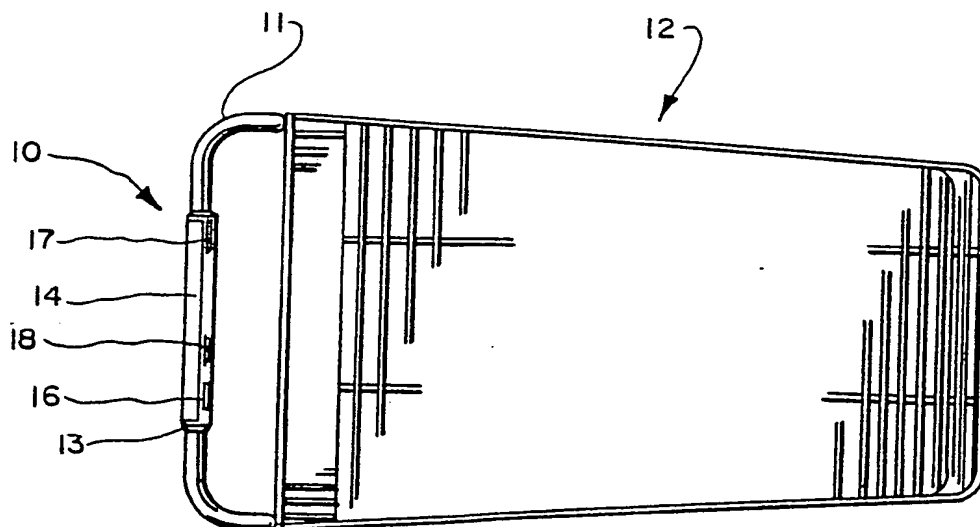
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(21) International Application Number: PCT/US90/07128 (22) International Filing Date: 5 December 1990 (05.12.90) (30) Priority data: 497,342                      22 March 1990 (22.03.90)      US 608,167                      1 November 1990 (01.11.90)      US (71) Applicant: KLEVER-KART, INC. [US/US]; P.O. Box 8045, Salt Lake City, UT 84118 (US). (72) Inventors: BEGUM, Paul, G. ; 133 First Avenue, Salt Lake City, UT 84103 (US). YOUNG, Gordon, W. ; P.O. Box 8551, Salt Lake City, UT 84108 (US). (74) Agent: MALLINCKRODT, Robert, R.; Mallinckrodt & Mallinckrodt, 10 Exchange Place, Suite 510, Salt Lake City, UT 84111 (US).		(81) Designated States: AT (European patent), AU, BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GI (European patent), IT (European patent), JP, LU (European patent), NL (European patent), NO, SE (European patent).  Published With international search report.

(54) Title: DEVICE FOR PROVIDING ADVERTISING TO SHOPPERS



## (57) Abstract

A portable device (10) for accompanying a shopper during shopping in a particular store includes a memory (20) which stores advertising information and information regarding specials for products carried by the store, and a display (14) for displaying such information. Such advertising information may be displayed periodically during use of the device (10) by a shopper or the information regarding a particular product may be displayed in response to a trigger signal in the vicinity of the particular product concerned so a shopper sees the information displayed as the shopper approaches the product being advertised by the display (14). The device preferably also includes input keys (15, 24) and the memory (20) contains store directory information so that a shopper can use the device to determine the location of specific products.

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DEVICE FOR PROVIDING ADVERTISING TO SHOPPERS  
SPECIFICATION

Background of the Invention

5        Field:     The invention is in the field of advertising devices and shopping aids wherein advertising can be tailored and directed to shoppers in a particular shopping location and may be directed to a particular shopper's interest.

10        State of the Art:   The extremely large number of items carried by the average supermarket or super store, or entire shopping malls, makes it difficult for advertisers to advertise specific products to specific customers who may be interested in such products and to advertise directly to the shopper while the shopper is shopping. In-store advertising  
15        displays are effective for shoppers who actually find and pass the displays, and in-store announcements are effective for the few shoppers actually interested in the particular item being announced. However, in-store daily or weekly  
20        specials are normally too numerous to announce in a manner that most shoppers will hear, since announcements made on a continuous basis destroy the atmosphere most stores try to create and would annoy many shoppers.

25        A major problem with supermarkets, super stores, or malls is that it is very difficult for a shopper to locate the particular type of item being looked for. Thus, if a shopper goes into a  
30        supermarket looking for peanut butter, unless the shopper has purchased peanut butter at that store recently so she or he knows where the peanut butter is kept, it can be difficult and frustrating to locate the peanut butter. A number of stores have developed store directories or store maps to help  
35        the shopper find general categories of goods, but they are difficult to use. Large stores or shopping malls have also tried large, stationary computerized

video display equipment by which a shopper trying to find the location of certain goods can enter the common name of such goods into the equipment through a keyboard or by touching successive on-screen menu displays and the location of the desired goods will be displayed to the shopper on the video display. Some such equipment also includes a printer to print out the location of the desired goods so the shopper can locate several desired goods at once and does not forget the location of one of the desired goods while locating the others. A problem with this type of equipment is that most stores that might have such equipment have only a limited number of units and, since the units are stationary, a shopper first has to locate an available unit before she or he can use it.

#### SUMMARY OF THE INVENTION

The invention enables a shopper to be continually reminded of various specials in force at a particular shopping location, to be reminded of certain brands of products available at such location, or to ask and be told where certain products can be found. All of this is achieved by an information storage and output device designed to be kept in proximity to a shopper during shopping. The device stores information to be directed to the shopper and provides such information periodically to the shopper during shopping and may incorporate a shopping location directory along with interface means whereby a shopper can enter a particular type of product desired and the device will provide information to the shopper as to the location of such product. The device can also be made to provide information to a shopper as to any specials the store may have on such a product or to provide an advertising message regarding a particular brand

of the selected product.

5       The device of the invention includes an  
information storage or memory system in which the  
information to be provided is stored, as well as  
means for periodically receiving information to be  
stored. Means are also provided for selectively  
supplying stored information to an information  
output means. Thus, information stored in the  
device can be periodically updated and can be  
10       supplied selectively to a potential customer.

15       In a preferred form of the invention, the  
information storage or memory system and the  
information output means are incorporated in a  
device which locks onto the handle of the usual type  
of shopping cart or is in the form of a special  
handle for the usual type of shopping cart, which  
device or handle incorporates a battery as a power  
source and a liquid crystal display (LCD) on which  
shopping and advertising information is displayed to  
20       the shopper as the shopper shops. The battery is  
easily replaceable or rechargeable and the entire  
device or handle may be made easily removable and  
replaceable by authorized personnel so maintenance  
can be easily carried out. The memory system is  
25       preferably of a type that can be reprogrammed by  
remote control such as by infrared transmission, or  
by ultrasonic, inductive, or radio signals.

30       In its simplest form, the device may have  
merely a series of advertisements for various goods  
sold by the store concerned stored in the memory of  
the device; the advertisements are then displayed to  
the shopper in a preferred sequence or randomly  
through the LCD display. An audio device, such as  
a beeper, can be set to sound each time a new  
advertisement is displayed so as to call the  
35       shopper's attention to the display. Rather than  
merely displaying the advertisement on a preset or

random basis, the device may be set to receive trigger signals from various product locations so that no display is present until the device comes within a certain range of a product and receives a trigger signal which triggers a specific one of the advertisements stored. Thus, units which generate the trigger signals may be located on or near displays or merely on the shelf location of certain products so when a shopper with the device nears such products, the device displays an advertisement for that particular product. In this way, the advertisement, along with information as to special prices, is given a shopper when in front of the product concerned.

In another form of the invention, the device may also include a keyboard or other input means through which a shopper can enter or select various categories of goods desired and the memory will respond by a display on the LCD of the location in the store where such goods can be found. This may be followed immediately by an advertisement of a particular brand of such goods. In this way, an advertiser can selectively reach the shopper looking for a specific type of goods and, hopefully, can influence the shopper at the point of sale. Even if the shopper knows the location of the goods desired, the shopper can enter the class of goods into the device to see if any specials are currently in effect for such goods by means of advertisements presently on the display.

The store directory feature provides the advantages of less personnel time spent directing shoppers to the location of specific goods, of more satisfied shoppers in that a shopper can easily find desired goods, and of specifically targeted advertising for a producer directed personally to a potential purchaser at the time of making a

purchase. If desired, the device with keyboard can also operate as a calculator for the convenience of the shopper.

5 When the device is incorporated into a shopping cart, the system may be easily updated while the cart is in a usual cart storage location. Most stores that use shopping carts have one or more storage locations near entrance doors. Carts are taken from such areas by shoppers and, after use, 10 the carts are returned to such areas to be available for further use. The means for receiving information to be stored may be such as to receive information in any one of a variety of ways. For example, the device may include an infrared 15 receiving device, similar to those used for remote control of television sets, and an infrared transmitter may be provided in the area or areas of shopping cart storage. Thus, when new information is to be stored in the device, such information is 20 transmitted directly to the carts. Rather than being adapted to receive information by infrared transmission, the memory system may be of a type that will receive information by other means, such as by ultrasonic, inductive, or radio signals.

25 If desired, the device may also include one or more speakers and receiving means for receiving localized broadcast signals so local announcements may be broadcast, either storewide, or very localized in the vicinity of a certain product or 30 special display.

Also, the device of the invention may be included as part of a shopping cart anti-theft system wherein the device is programmed to receive a preset signal at preset intervals. The preset 35 signal is provided in the store and store parking lot, but is localized to such areas. If the signal is not received by the device at the preset

intervals, as will happen if the cart is taken beyond the area in which the signal is provided, an alarm is activated advising the shopper taking the cart to return it to the store.

5

#### THE DRAWINGS

In the accompanying drawings, which show the best mode presently contemplated for carrying out the invention:

10

Fig. 1, is a side elevation of a shopping cart showing a device of the invention installed on the handle;

Fig. 2, a top plan view of the shopping cart of Fig. 1;

15

Fig. 3, an elevation of the display face of the device of the invention taken from the standpoint of the line 3-3 of Fig.1;

20

Fig. 4, a view similar to that of Fig. 3, but showing a different configuration of the display, with keyboard for shopper input;

Fig. 5, a view similar to that of Fig. 3, but showing a still different configuration and arrangement;

25

Fig. 6, a block diagram representative of the system of the invention;

Fig. 7, a circuit diagram showing circuitry for transmission and receipt of data by infrared signals;

30

Fig. 8, a flow chart showing operation of a microprocessor program usable with the device of the invention to control receipt of data by the device;

Fig. 9, a circuit diagram showing circuits for transmission and receipt of data inductively;

35

Fig. 10, a circuit diagram showing circuits for transmission and receipt of data ultrasonically;

Fig. 11, a flow chart similar to that of Fig. 8, but showing how an anti-theft alarm can be



incorporated;

Fig. 12, a block diagram of an optional broadcast system usable with the device;

5 Fig. 13, a schematic circuit diagram showing circuitry for transmission of display trigger signals by infrared transmission; and

Fig. 14, a flow chart similar to that of Fig. 8, but showing how display trigger signals can be incorporated.

10

#### DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Figs. 1 through 5, show the invention as specifically adapted for use in connection with the normal shopping carts currently used in  
15 supermarkets, super stores, and variety stores. As shown, the device 10 is mounted on the handle 11 of the usual shopping cart 12. The device includes a housing 13, a display area 14, and, in the preferred embodiment shown in Figs. 4 and 5, a keyboard 15.  
20 If provided, the keyboard may be variously located relative to the display. As shown in Fig. 4, it may be segregated at one side of the display. As indicated in Fig. 5, it may be at and extending along either the top or the bottom of the display.  
25 In any event, the device is mounted so that the display is easily visible to a shopper using the shopping cart and so that the keyboard may be easily used by the shopper. If the device uses an infrared data-receiving means, a window 16, Fig. 2, is  
30 provided to receive the transmitted infrared signals. A battery-access cover 17 is provided to provide access to a suitable electrical storage battery (not shown), such as a rechargeable nickel-cadmium battery, for recharging or replacement.  
35 If desired, a solar panel 18 may be included to provide power to the device for recharging the batteries during conditions of sufficient light.

Rather than providing the device in a housing which is mounted on the usual handle of the normal shopping cart, a special shopping cart handle with the device built into the handle may be provided. In such instance, the battery may be housed in a removable portion of the handle for easy removal for charging or replacement. Further, the device on the handle, or the handle itself, is mounted in a manner that it is difficult for an unauthorized person to remove, but may be easily removed by an authorized person with the proper tool or a key.

As shown by the block diagram of Fig. 6, the basic device of the invention includes an information storage means or memory 20 which stores information therein relating to shopping at the location in which the device is used. This information, for example, may be advertising information and store directory information. The device also includes information receiving means 21 so that information can be updated remotely, and information output means, such as a visual display 22, so that the stored information can be communicated to the shopper using the device. A control means 23, such as a microprocessor, controls operation of the device and, as such, operatively associates the information receiving means with the memory to insure that information received by the information receiving means is properly stored in the information storage means. The control means 23 also selectively provides information from the information storage means to the information output means. The device may also include shopper input means 24, such as a keyboard, through which a shopper using the device can input information to the control means.

Since in many stores promotional specials, desired advertising, or other information changes on

5 a weekly or even daily basis, information stored in the device of the invention has to be updated each time the information changes. The information receiving means is provided for updating the information stored in the device and may take many forms. Its purpose is to receive information to be stored in the information storage means from a remote source. The receiving means may receive information, for example, via infrared transmission, 10 ultrasound transmission, inductive transmission, or radio transmission. Information received by the receiving means is sent through control means 23 to the information storage means.

15 Control means 23 is preferably a CMOS microprocessor such as a Motorola MC68HC705C8. The CMOS structure gives the microprocessor a low power requirement to reduce battery drain and increase battery life. The microprocessor is connected to the information storage means such as a CMOS static 20 random access memory (RAM) chip available from many sources such as Motorola. The RAM chip should have a minimum of 16K memory capacity.

Control means 23 is also connected to an information output means 22 such as an LCD visual 25 display available from many sources such as Hitachi. The size and capability of the display used will depend upon the output requirements of the device.

In most cases, it is also preferred that a shopper input means, such as a keyboard 24, also be 30 provided and connected to the microprocessor 23. The keyboard may be a separate keyboard unit such as a low cost membrane or rubber keyboard, as shown in Fig. 4, or the keyboard may be incorporated into the display so that when it is desired to use the 35 keyboard, the keys are displayed along the bottom of the display as shown in Fig. 5 and merely touching the display over the key operates the key. While

the keyboards shown have separate keys corresponding to each letter of the alphabet, keyboards with a lesser number of keys could be used satisfactorily.

5       The device will also include an oscillator 25 which acts as a clock for the microprocessor, and will include a power supply 26. No connections for the power supply are shown so as not to complicate the figures, but the supply will be connected to all blocks to supply the required operating power.  
10       Since the device is portable, the power supply will normally take the form of some type of battery, preferably a rechargeable type of battery, such as a rechargeable nickel-cadmium battery. A lithium or other type battery could also be used. A solar cell  
15       can be provided to provide power to the device, but if provided will preferably be in addition to the battery and will be used to charge the battery during periods of sufficient atmospheric light. In such instance, the battery provides power and  
20       ensures integrity of the memory and operation of the device in poor light conditions. If desired, an extra battery can be provided to supply power to the memory and preserve the data in the memory when the battery powering the full circuitry discharges to an  
25       extent that it can no longer power the device, or during the changing of such battery.

      Since power consumption of the device and resultant battery drain is a concern, it is desirable to keep power consumption as low as  
30       possible. Power consumption is minimized during normal operation of the device by using a CMOS type microprocessor and memory and by using a low frequency crystal such as a 32KHZ watch crystal as the clock oscillator 25. Also, special data input  
35       routines, as will be explained, are utilized. It is also preferred to provide an active operation switch to start and continue operation of the display only

during periods of use of the device. Thus, when the device is not in use, the display is switched off to reduce the power drain and increase battery life. The active operation switch may take several forms  
5 such as a motion sensor or proximity switch or may be activated by a trigger signal transmitted to the device. However, with the low power requirements of modern LCD displays, satisfactory battery life can usually be obtained without turning off the display.

10 In operation, information regarding store specials, desired advertising, and other information such as store directory information is remotely fed to the device via the information receiving means 21. Control means 23 stores the received  
15 information in the storage means 20. The information transfer will usually take place in an area where the carts are normally stored, such as the cart storage areas near the entrances to the store. In this way, data signals localized to such  
20 storage areas can be used and, since usually substantially all carts are returned to the cart storage areas at least several times during a day, substantially all carts will receive updated information.

25 When a shopper takes a cart from the cart storage area, if active operation of the device has been stopped, active operation of the device is initiated by the operation switch 27. This switch  
30 may be activated by motion of the cart as it is moved about by the shopper or by sensing the presence of the shopper, such as the presence of the shopper's hands on the cart handle as the cart is moved. The control means will preferably have a  
35 timer to continue active operation of the device for a set period of time, such as two minutes, after each activation of the operation switch 27. Thus, as long as the cart is moved or the hands are placed

on the handle during the time of active operation of the device, active operation continues for additional time periods.

5 When active operation of the device starts, control means 23 selects information from storage means 20 and displays it on display 22. In its simplest form, the stored information will represent a plurality of advertising displays either advertising in store specials or merely advertising particular products sold by the store. For example, 10 as shown in Fig. 3, an advertising message for a display could read "Skippy the super chunk peanut butter is on sale now. 28 oz. is 30 cents off." This message would be displayed for a set period of 15 time, such as five seconds, and then a different message for a different product would be displayed for a like period of time, followed by a third different message, and so on. Messages would continue to be displayed and changed at the preset 20 intervals for as long as active operation of the device continued. If there was no movement of the cart, or other required action to maintain active operation within the preset period, active operation would cease and there would be no display until 25 active operation was again begun by activation of the operation switch 27.

The control means 23 may be programmed to always start with the same message and proceed 30 through the stored messages in a predetermined order, or messages may be randomly selected with each message having an equal chance to be chosen each time a new message is displayed. In this way, over a period of time all stored messages will have an equal chance of being displayed to a shopper. An 35 audio output device 28, such as a beeper, may be included in the device to produce a sound each time a new message appears on the display, or at various

other time intervals, to draw the shopper's attention back to the display so the shopper can take note of new messages. However, care must be taken that sounds are not produced at a rate which annoy the shopper. Thus, in many cases an audio output will not be desired.

Alternately, rather than starting operation of the display when a shopper starts moving the cart, the operation of the device could be started by receipt of a start or trigger signal transmitted to the device. In such instance, the start signal can identify the particular advertising message to be displayed. For such operation, local transmitter units which transmit the start and advertisement selection information as a trigger signal to the device, such as by infrared or other transmission, are located on shelves alongside particular selected products, on special displays of selected products, or otherwise located to provide the trigger signal locally in the immediate area of the product concerned. Thus, such a transmitter may be located adjacent the Skippy peanut butter so that as a shopper approaches the peanut butter on the shelf, the device receives the trigger signal from the transmitter and displays an advertising message such as the example previously used, "Skippy the super chunky peanut butter is on sale now. 28 oz. is 30 cents off." In this way, the advertising message is shown to the shopper as the shopper is in front of the peanut butter and immediately at the time when a selection of the product is to be made, or at least at the time the shopper is adjacent the product to entice the shopper to purchase the product. An audio signal may be activated each time a display is activated to draw the shopper's attention to the display.

If the trigger transmission is the same type of

transmission as used for transmission of the updated information to be stored by the device, such as both being by infrared transmission, the trigger transmission can be received by the information receiving mean 21. The information received is coded differently than the updated information to be stored by the device and is recognized by the control mean 23 which retrieves the particular advertising identified by the trigger transmission and causes it to be displayed for a predetermined period of time, such as ten seconds. After displaying the triggered advertising, the device becomes inactive until a further trigger signal is received.

If the trigger signal is a different type of transmission than the information update transmission, such as the trigger signal being transmitted by radio transmission or ultrasonic transmission while the information update information is transmitted by infrared transmission, the operator switch 27 can include a receiver suitable for receiving the trigger signals and sending them to the control means which retrieves and displays the desired advertising.

The advantage of this type of triggering operation where the advertising is display for only about six to ten seconds, is that the display is active much less of the time so that battery life is extended, in some cases from about two weeks to about six months, the shopper is actually in front of the goods being advertised during the advertising, and the advertising is more directed and comes when the customer is interested in the particular advertising concerned so does not block out continuous advertising from his or her mind. Thus, the shopper is not subject to continuous commercials as he or she shops.



While the device is effective in the form described merely displaying a sequence of advertising messages and in such form no shopper input means is required, in many instances it will be desirable to provide a store directory in association with the device and in such instances the shopper input device, such as keyboard 24, may be incorporated into the device. Where such is the case, directory information is stored in the memory in addition to the advertising messages. While information could be stored and the control means arranged so that if a shopper wanted to know where to find the peanut butter in the store, the shopper, using the keyboard, could enter the words "peanut butter" and the location of the peanut butter would be displayed, it is preferred that the directory information be stored as general categories and that the general categories be displayed by menu for selection by the shopper. Most supermarkets have about 40,000 different stock keeping units (SKU's) i.e. 40,000 different products. These can, however, be broken down into about 100 categories of products such as dairy, cookies, canned fruits, etc., which will meet the needs of most shoppers. Categories where the location of such categories in the store is usually obvious, such as fresh fruits, vegetables, and meats, need not be included in the directory. The greater the memory in the device, the greater the number of categories that can be stored and the narrower the categories can be defined. With the categories stored in memory, the control means is programmed so that when a shopper depresses a key on the keyboard, the various categories beginning with the letter depressed will be sequentially displayed. Thus, if a shopper is looking for peanut butter, the shopper touches the "p" key. The "p" categories would then be displayed

in sequence with each category displayed for a set time, such as three seconds, so it can be seen by the shopper. For example, the first category displayed may be "pans" followed by "party goods" followed by "peas" followed by "peanut butter" followed by "pies" and then "pizza". The shopper looking for "peanut butter" would depress a special key, such as the last key of the display, when peanut butter was displayed, and the display would then stop scrolling through the categories and display "Peanut Butter 12-A", Fig. 4. This tells the shopper that the peanut butter is located on aisle 12-A. The control means can then be programmed to display any advertising message in the memory dealing with peanut butter so that the advertising message is directed to a shopper specifically looking for and ready to buy peanut butter. If the shopper missed the desired category, the shopper can go through the categories again, or a key can be provided to reverse the scrolling order to thereby back up the list of categories.

With the directory feature, even if a shopper knows where to find the goods being purchased, the shopper can enter the category of goods into the device in the manner indicated to see if there are any specials for those goods in effect.

As indicated, the remote data transfer to the carts can be accomplished in various ways. The data to be supplied to the device is assembled in a separate unit such as an in-store computer. The information as to the specific advertisements regarding daily or weekly specials, other products to be advertised, and store directory information is entered into the computer and can be edited in the computer. Thus, when specials or advertisements are to be changed, they can be easily changed by store personnel using the central store computer. Rather

than using the store computer, a special separate computer for the purpose of compiling the information for the carts can be provided. Alternately, the information to be fed to the carts could be compiled at a central location and first transmitted to individual stores over telephone lines, by microwave transmission, or by other means whereby the information is received by individual stores for further transmission to the carts. In any event, once the information to be supplied to the devices is compiled, it is transmitted to the individual devices on the carts.

As indicated previously, this transmission to the carts may be made in various manners, such as by infrared transmission. Further, it is advantageously made in a local area where the carts can be placed to receive the transmission. Conveniently, this local area can be the normal cart storage area or other areas near the entrance doors to the store where the carts are normally placed. Alternately, the transmission of the information could cover the entire store, and areas outside the store, if desired, to reach carts regardless of their location.

Fig. 7 shows a basic data transmission system for transmitting and receiving infrared signals that can be used with the device of the invention. The data from the computer in which the data is compiled, or from other data sources, is supplied to the input of driver and modulating amplifier 35. The output of driver amplifier 35 controls the operation of light emitting diodes indicated as LED1 to output the data from the computer as modulated light of infrared frequency. Resistors R1 are provided to limit the current passing through the diodes LED1. Several diodes LED1 will normally be provided to insure that the infrared signal covers

the entire area desired to be covered. These diodes can be mounted on or suspended from the ceiling over the cart storage area, and directed to cover the entire storage area, or can be positioned and directed to cover wider areas, if desired.

Each device on a shopping cart will include as its information receiving means 21, an infrared photodiode D1 which receives the infrared light signal produced and transmitted by the LED1's. The photodiode D1 is connected across the inputs to amplifier 36 and produces a voltage when receiving transmitted signals. The output of amplifier 36 is connected to the input of demodulator amplifier 37 which demodulates and conditions the received signals for use by the device's microprocessor. The output of demodulator 37 is sent to the microprocessor which evaluates the data received. Resistor R2 and diode D2 control the gain and demodulation properties of demodulator 37. The information receiving circuitry may be continuously ready to receive a transmission of information, or power to operate the information receiving circuitry may be controlled so that the circuitry is turned on only when information to be received and stored is being transmitted.

While the transmission of data to the individual devices on the shopping carts can be scheduled to take place at certain times when all shopping carts can be rounded up and placed in the data receiving areas, such as at night when a store is closed, in many instances it may be desirable to be able to transmit new or updated information to the devices at any time and as often as necessary to keep the information properly updated. In order to conserve power while watching for updated information which may be received at any time by the information receiving means, rather than keeping the

information receiving means activated on a continuous basis, the microprocessor may be programmed to activate the information receiving means for a very short time duration at regular intervals of time. For example, the information receiving means could be activated for a period of 10 milliseconds every two minutes. This provides a duty cycle of only 0.008%. This extends battery life and allows data transfer electronics to require more power than would be the case if the information receiving means was continuously activated. Each time the information receiving means is activated, the microprocessor determines if any information is being transmitted to the device. If no information is being transmitted, the information receiving means is deactivated for another period.

When data is being transmitted to the information receiving means, such information can be coded and the particular code repeated several times during the transmission. When the information receiving means is activated and the microprocessor determines that information is being transmitted to the carts, the microprocessor is programmed to compare the code in the transmission with the code of the prior transmission of data received. If the code is the same as the code for data already received, the microprocessor again deactivates the information receiving means for another period. If, however, the code is different from that in information already received by the device, the microprocessor keeps the information receiving means activated for the time necessary to receive the entire transmission of information and stores such information received in the information storage means. It also stores the code provided with such information so that it can determine when new information is provided. In such instance, the

information to be transmitted to the carts will be repeated a number of times to insure that substantially all carts will receive a complete transmission of all information.

5           Fig. 8 shows a program flow chart for the operation of the microprocessor as described above. Upon start of operation of the program, power is supplied to the information receiving means, such as through connection 38, Fig. 7, for ten  
10           milliseconds every two minutes. Upon activation of the information receiving means, the microprocessor determines if a data signal has been received. If "No" the program merely continues to cycle power on at the set periods of time. If "Yes", the power to  
15           the receiver is kept on until the code is received. The code is checked to determine if it is the same as information already received. If "Yes" the program goes back to its cycling mode. If "No", the new data transmission is accepted and the data  
20           stored. When the complete data transmission is accepted, the power to the information receiving means is shut off and regular cycling is begun again.

          Fig. 9 shows schematically the circuitry used  
25           if the data transmission to the device is done inductively. An inductive loop 40 is provided around the area where the shopping carts are stored. The data transmission signals are generated by the induction loop. Each information receiving circuit  
30           includes a pick-up coil 41 connected to the inputs of amplifier 42. The output of amplifier 42 is connected to the input of amplifier 43 which provides the output data signal to the microprocessor. Resistor R3 and diode D3 control  
35           the gain of amplifier 43. The power to the amplifiers 42 and 43 may be controlled as described above.

Fig. 10 shows schematically the circuitry if the data is transmitted to the device ultrasonically. The data from the computer is amplified and modulated by modulator amplifier 45 and sent to ultrasonic transducer 46 which produces the ultrasonic signals. The information receiving circuit includes an ultrasonic receiver 47 which receives the transmitted ultrasonic signals and sends them to amplifier 48. The output of amplifier 48 is connected to demodulator 49 whose output is sent to the microprocessor. Again, the power to the circuit may be controlled as indicated.

While three specific examples of information transmission and receiving circuitry have been given, it should be realized that various circuits can be used and that various other types of transmissions can be used. For example, rather than infrared, ultrasonic, or induced signals, radio or microwave signals could be used to transmit the information and could be transmitted from within the store, or from a central location outside the store such as a radio transmitter or satellite.

The same transmission and receiving circuitry as shown in Figs 7, 9, and 10 may be used when localized trigger signals are to be sent and received. Thus, if the trigger signals are to be sent by infrared transmissions, a small self contained infrared signal transmission unit may be positioned in association with the product to be advertised. Each unit may be as shown in Fig. 13 and include a microprocessor or other circuitry to supply the data input, along with the data transmission circuitry of Fig. 7. Referring to Fig. 13, a transmission control means 50 is programmed to provide a data signal to the input of driver and modulating amplifier 51, similar to amplifier 35 of Fig. 7. The output of amplifier 51 controls the

operation of light emitting diode LED2 to output the data from transmission control means 50 as modulated light of infrared frequency. Resistor R4 is provided to limit the current passing through diode LED2. With the local transmitter unit, a single light emitting diode may be used since only a very limited range of transmission is desired, although several light emitting diodes, as shown in Fig. 7, could be used if needed for particular transmission patterns. The entire unit will usually be battery powered, such as by a battery B1 connected to the various circuit components in normal fashion, such connections not shown, since it will generally be located on a shelf where other power is not available, and is portable so can be placed where desired and moved as desired.

The transmission control means may take the form of a microprocessor programmed to repeat a preset data or code signal which identifies the signal as a trigger signal and identifies the particular advertising stored in the device memory that is to be displayed in response to such signal. For example, if fifty different advertisements can be stored in the device memory, the advertisements may be stored and identified by numbers between one and fifty. Then, if the trigger unit is to be used on the Skippy peanut butter shelf, and the Skippy peanut butter advertisement is stored as advertisement number fifteen, the trigger signal would identify itself as a trigger signal and identify advertisement fifteen. If used with other products, other appropriate advertisement numbers would be used.

The transmission control means may be permanently set with the data to be transmitted so that a particular unit would always be used to identify advertisement fifteen and another



particular unit always used to identify advertisement sixteen, etc., or the unit may be made programmable so that information from another computer or programming unit, indicated as "code Information Input" in Fig. 13, can be supplied to the unit to periodically set the particular output data generated by the transmission control means.

As indicated above, when the information update signals to the device and the trigger signals are both transmitted using the same transmission medium, such as infrared transmission, both signals can be received by the same information receiving means 21, Fig. 6. If the information update transmission and the trigger transmission are transmitted through different mediums, such as one transmitted as infrared signals and one as ultrasonic signals, two receiving means will be provided. However, the received signals will both be provided to the control means 23, Fig. 6. The control means may be programmed as shown in Fig. 14. Generally, the periodic operation of the receiver will not be desirable since a shopper may pass by several trigger units generating trigger signals in a time period such as two minutes. Therefore, the receiver should operate at all times during use, or at short time intervals such as every ten or twenty seconds. If desired, the operator switch 27, Fig. 6, may switch the operation of the information receiving means of the device from periodic operation to constant operation when the device is actually being used by a shopper. For continuous use, power is continuously supplied to the receiver. The program determines if a signal is present. If so, it then determines if the signal is an information update signal. If so, the program operates as previously described to determine if the information has been previously received, and if not, receives and

updates it's stored information. If the signal is not an information update signal, the program then determines if the received signal is a trigger signal. If not, the signal is merely a stray signal and no action is taken. If it is a trigger signal, the program determines if it is the same as the immediately previously received trigger signal. If it is, no display is activated and the program starts over. This is to prevent continuous reactivation of the same advertising as the shopper stands in front of a particular product. If the trigger signal is not the same as immediately previously received, the program determines the particular advertisement to be displayed and operates the device to display the identified advertisement. After display for the predetermined time, a time of between six to ten second having presently been found satisfactory to impart the information to the shopper, the display clears and the program returns to start.

If it is desired to incorporate an anti-theft feature into the device, signals similar to the data transmission signals may be provided throughout the authorized location for the carts. For example, if the data transmission is done by infrared signals, infrared signals may be generated throughout the store and the store parking lot. When data is not being transmitted, a holding signal can be transmitted, either continuously or periodically. Then, each time the information receiving circuitry is activated, the circuitry will receive either information signals or a holding signal, but in either case, the circuitry receives a signal. Fig. 11 shows a flow chart for a modification to the program of Fig. 8 that can be used with the system. Upon activation of the information receiving circuitry, if a signal is present, the

microprocessor determines if it is a data signal or merely a holding signal. If a data signal, the system proceeds as explained for Fig. 8. If a holding signal is received, the system continues to cycle on and off normally. If no signal is received, an alarm condition is noted. With an alarm condition noted, the device may take any of several desired appropriate actions. First, to ensure that false alarms do not occur, the system may be programmed to receive a predetermined number of consecutive alarm condition indications prior to actually activating the alarm. This makes it less likely that a missed signal or two caused, for example if the infrared signals are being used, by something blocking the signal window, does not set off the alarm. When the conditions for activating the alarm are met, action such as sounding an alarm device, or activating a synthesized voice output nicely asking that the cart be returned to the store, may be taken. By using a synthesized voice output for the alarm, a special message psychologically designed to induce return of the cart may be used. Thus, a message may state "We at X store are trying to keep grocery costs down. In order to help us reduce our costs and pass the savings along to you, please return this cart to our store." In addition to an audio alarm or message, a message such as "Please return this cart" could be displayed visually on the display of the device. Similar program modifications could be made to the program of Fig. 14, if desired to use the anti-theft feature with that program.

The alarm system described would work similarly for signals transmitted by other than infrared transmission. Further, with such a system the data signals may be transmitted in one area of the store and the holding signal transmitted in other areas.

Additionally, the data signals and holding signals may be transmitted and received separately and by different means such as infrared transmissions used for data transfer and induced signals for the holding signals. Various other signal and alarm conditions detecting circuitry and/or programs can also be used, the presence or absence of signals being used to indicate non-alarm and alarm conditions.

In some cases it may be desirable to include one or more small speakers in the unit and a special receiving means for receiving localized signals, separate from the data signals, so that local announcements may be broadcast through the speaker. As the customer moves through a store, messages are received by the special receiving means in the form of infrared, ultrasonic, electromagnetic, or magnetic field inputs from small, short range transmitters. These transmitters may be set to operate only over short distances, so that a shopper receives a recorded message from the transmitter only when she or he is close to the transmitter, or may operate over the entire store for storewide announcements. Fig. 12 shows a block diagram of the system which includes a transmitter 55, a receiver 58, and a speaker 57. The transmitted message, i.e., audio input, may originate from a continuous loop tape recorder, a solid state electronic synthesizer, or other source and relate to specific products or product displays, or may originate live from an announcer in the store or over a centralized store announcement system wherein announcements for stores are produced in a central location and transmitted to individual stores such as by microwave transmission. Thus, as a shopper approaches a product display, she or he may hear an audio message regarding the display, or he or she

5 may hear storewide announcements, when made. Such audio messages may be used with or without the special triggering of specific displays as previously described, or may be used in connection with or even as the triggering signals.

When using a keyboard with the device, the keys can work as numerical input keys as well as alpha keys and the device can be made to function as a calculator.

10 While the device has been described in relation to an attachment for shopping carts, the device, particularly if used in a shopping mall, could take the form of a device to be carried by a shopper or worn on a cord around the shoppers neck.

15 Whereas this invention is here illustrated and described with specific reference to an embodiment thereof presently contemplated as the best mode of carrying out such invention in actual practice, it is to be understood that various changes may be made  
20 in adapting the invention to different embodiments without departing from the broader inventive concepts disclosed herein and comprehended by the claims that follow.

Claims

1. A portable device for accompanying a shopper during shopping, comprising information storage means; means operationally associated with said storage means for receiving information to be stored from an information source so as to periodically update information that has been stored, said information relating to shopping at a particular location; information output means for communicating stored information to the user of the device; and control means for selectively providing information from the information storage means to the information output means.

2. A device according to Claim 1, wherein the control means selectively providing information provides information in a predetermined order from the information storage means to the information output means.

3. A device according to Claim 2, wherein the information output means is a display for visually providing information, wherein the information stored is information providing a plurality of separate visual displays, wherein information selected at any one time is information to provide one of the plurality of visual displays, and wherein the information provided in a predetermined order provides separate visual displays in a predetermined order.

4. A device according to Claim 3, wherein the visual displays represent advertising for products available at the particular location.

5. A device according to Claim 4, wherein the display is a liquid crystal display.

6. A device according to Claim 1, additionally including shopper input means.

7. A device according to Claim 6, wherein the

shopper input means is a keyboard.

5 8. A device according to Claim 6, wherein the information stored includes information responsive to input from the shopper input means, and wherein the control means for selectively providing information to the information output means can select information responsive to predetermined input from the shopper input means and provide such selected information to the information output means.

10 9. A device according to Claim 8, wherein the information responsive to input from the shopper input means is store directory information and the selected information locates products at the particular location in response to shopper input requesting such information for particular products.

15 10. A device according to Claim 9, wherein at least some of the shopper input is stored in the information storage means as a series of predetermined shopper input prompts which are selectively displayed to the shopper for selection by the shopper as shopper input.

20 11. A device according to Claim 10, wherein the predetermined shopper input prompts are categories of goods displayed for shopper selection, and wherein the information responsive to the shopper input is information indicating the location of the selected category of goods.

25 12. A device according to Claim 1, wherein the means for receiving information to be stored receives information by means of infrared transmission of information.

30 13. A device according to Claim 12, additionally including means for generating information to be transmitted to the means for receiving information, and infrared light emitting diodes for generating infrared signals

35

representative of the information to be transmitted and located to direct said signals to the means for receiving information.

5 14. A device according to Claim 1, wherein the means for receiving information to be stored receives information by means of ultrasonic transmission of information.

10 15. A device according to Claim 14, additionally including means for generating information to be transmitted to the means for receiving information, and ultrasonic transducer means for generating ultrasonic signals representative of the information to be transmitted and located to direct said signals to the means for  
15 receiving information.

16. A device according to Claim 1, wherein the means for receiving information to be stored includes a signal receiving coil and wherein the means for receiving information to be stored  
20 receives information induced in the signal receiving coil.

17. A device according to Claim 16, additionally including means for generating information to be transmitted to the means for  
25 receiving information, and means for inducing information to be transmitted in the signal receiving coil of the means for receiving information.

18. A device according to Claim 1, wherein the  
30 control means selectively providing information provides information in response to a trigger signal received by said device.

19. A device according to Claim 18, wherein the  
35 information output means is a display for visually providing information, wherein the information stored is information providing a plurality of separate visual displays, wherein information



selected at any one time is information to provide one of the plurality of visual displays, and wherein the information provided in response to a trigger signal provides a visual display as selected by the trigger signal.

20. A device according to Claim 19, wherein the visual displays represent advertising for various particular products and wherein trigger signals are associated with the various particular products and are transmitted locally to the device within close range of particular of the various products to cause display of advertising for such particular product when the device is physically near such product.

21. A device according to Claim 20, wherein the trigger signals are infrared signals.

22. A device according to Claim 1, wherein the device is constructed and arranged for attachment to the handle of a shopping cart.

23. A device according to Claim 1, additionally including means for receiving anti-theft signals, and alarm means for indicating when anti-theft signals are not received.

24. A device according to Claim 23, wherein the means for receiving information receives both information signals and anti-theft signals.

25. A device according to Claim 1, wherein the device additionally includes means for receiving broadcast signals representing audio information, and speaker means for producing audio sound responsive to the received broadcast signals.

26. A shopping cart device for use by a shopper during shopping, comprising a shopping cart having a handle; information storage means mounted on said cart; means operationally associated with said storage means for receiving information to be stored from an information source so as to periodically update information that has been stored, said

information relating to shopping at a particular location; information display means mounted on the handle of the shopping cart so as to be easily visible to a user of the cart for communicating stored information to the user of the cart; and means for selectively providing information from the information storage means to the information display means.

5  
10  
15  
27. A shopping cart device according to Claim 26, wherein the information stored in the information storage means is representative of advertising messages for products sold at the particular location, and wherein the control means selectively providing information to the information display means causes sequential display of such advertising messages.

20  
28. A shopping cart device according to Claim 27, additionally including shopper input means, wherein the information stored includes store directory information, and wherein the control means causes display of directory information in response to shopper input.

25  
29. A shopping cart device according to Claim 28, wherein the information stored includes shopper input prompts, and wherein shopper input is provided in response to shopper prompts.

30  
35  
30. A shopping cart device according to Claim 29, wherein the shopper prompts include the name of general categories of goods sold in the particular location, wherein the shopper through the shopper input means can selectively begin display of the prompts, and wherein the shopper through the shopper input means can select a prompt being displayed, and wherein the control means displays the location of the goods covered by the selected prompt.

31. A shopping cart device according to Claim 30, wherein the control device causes display of any

advertising message pertaining to a selected prompt after displaying the location of the goods covered by a selected prompt.

5           32. A shopping cart device according to Claim  
26, wherein the information stored in the  
information storage means is representative of  
advertising messages for particular products sold at  
the particular location, wherein the control means  
selectively providing information to the information  
10 display means is responsive to trigger signals which  
initiate display of an advertising message and  
directs the control means in the selection of the  
particular advertising message to be displayed, and  
wherein trigger signals are transmitted locally in  
15 the immediate vicinity of particular products to  
trigger display of advertising messages relating to  
the particular products when the shopping cart  
device is physically near the particular products  
advertised.

20           33. A shopping cart device according to Claim  
32, wherein the trigger signals are infrared  
signals.

25           34. A shopping cart device according to Claim  
33, wherein means for receiving information to be  
stored is adapted to receive infrared signals and  
wherein the means for receiving information to be  
stored receives the trigger signals as well as the  
information to be stored.

30           35. A shopping cart device according to Claim  
26, wherein the means for receiving information to  
be stored receives information by means of infrared  
transmission of information.

35           36. A shopping cart device according to Claim  
35, additionally including means for generating  
information to be transmitted to the means for  
receiving information, and infrared light emitting  
diodes for generating signals representative of the

information to be transmitted and located to direct said signals to the means for receiving information.

5           37. A shopping cart device according to Claim 36, wherein the light emitting diodes are positioned above a shopping cart storage area so that information to be stored can be transmitted to the means for receiving information while the carts are stored in the storage area.

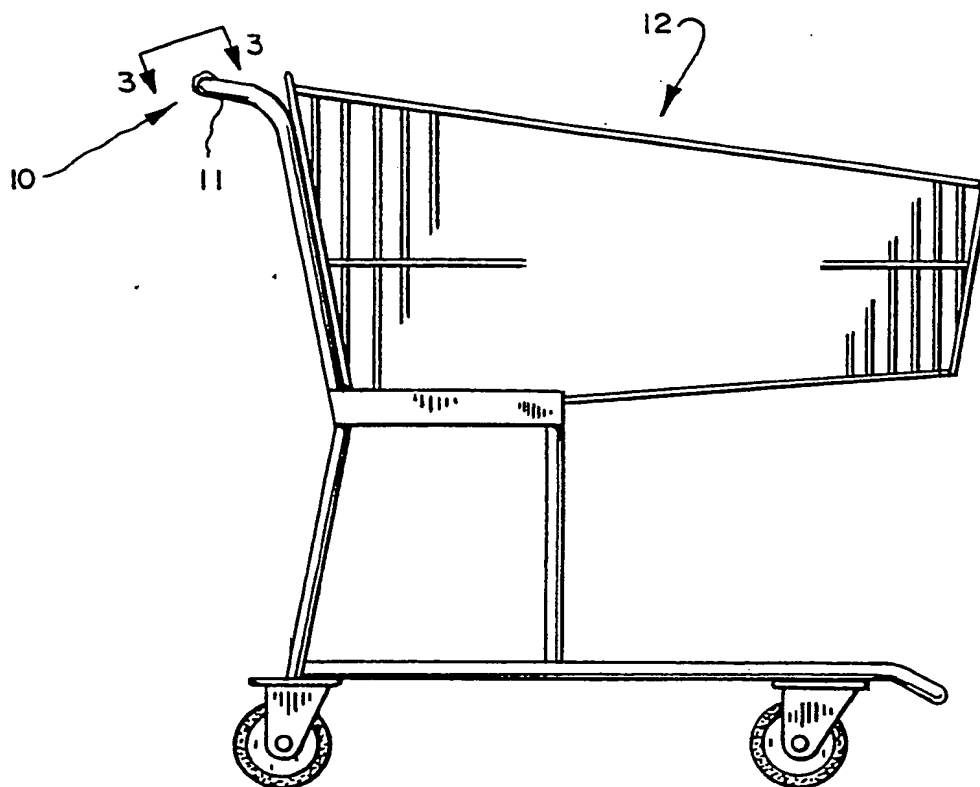


FIG. 1

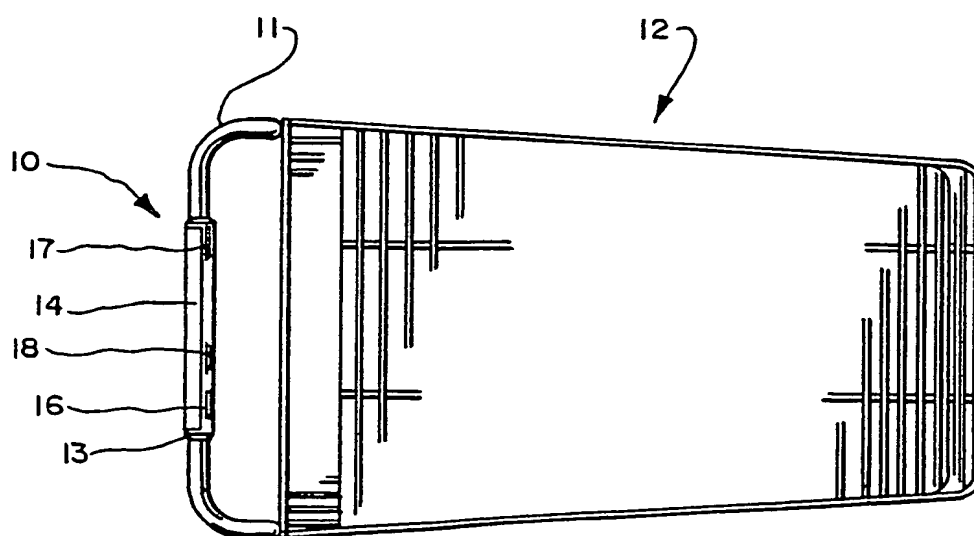


FIG. 2

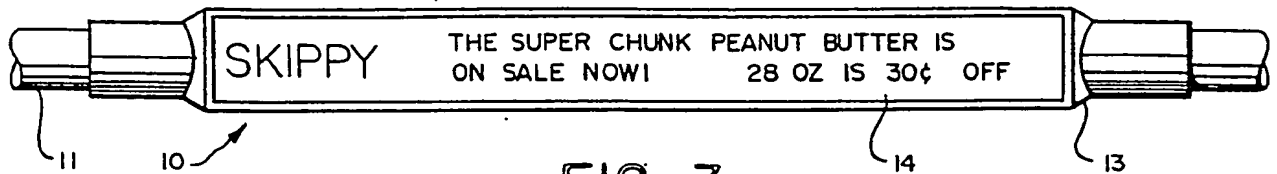


FIG. 3

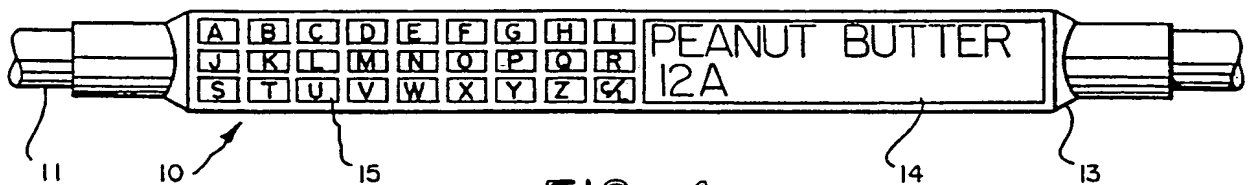


FIG. 4

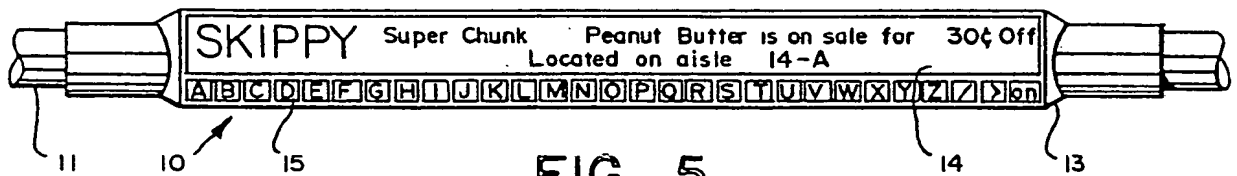


FIG. 5

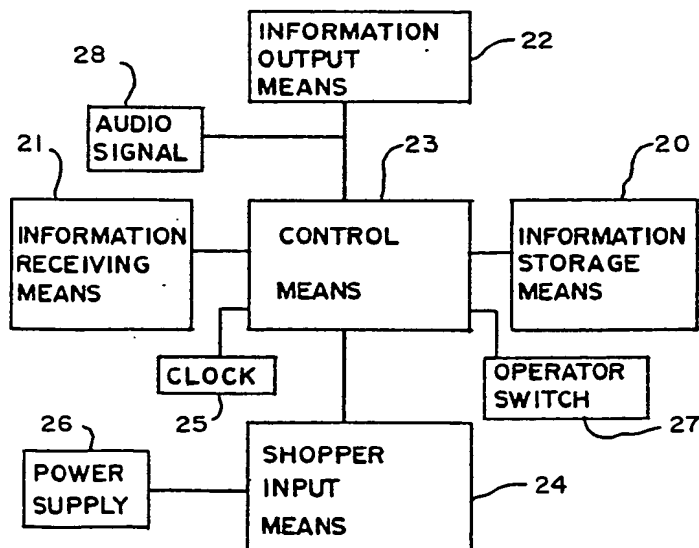


FIG. 6

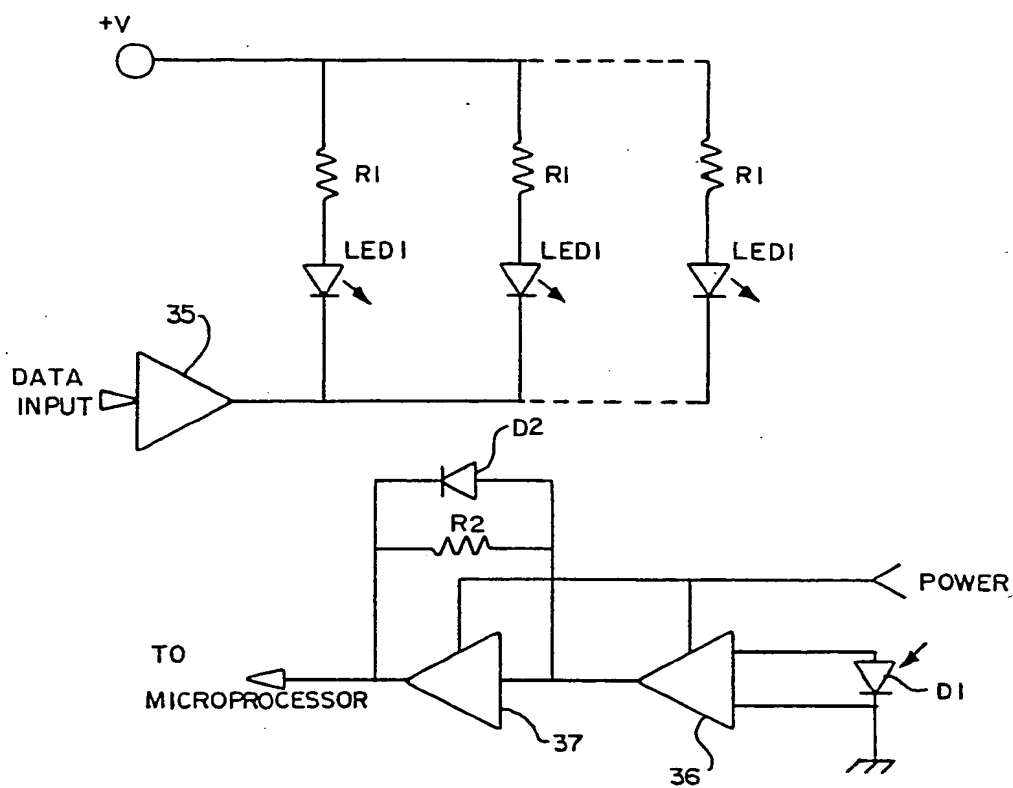


FIG. 7

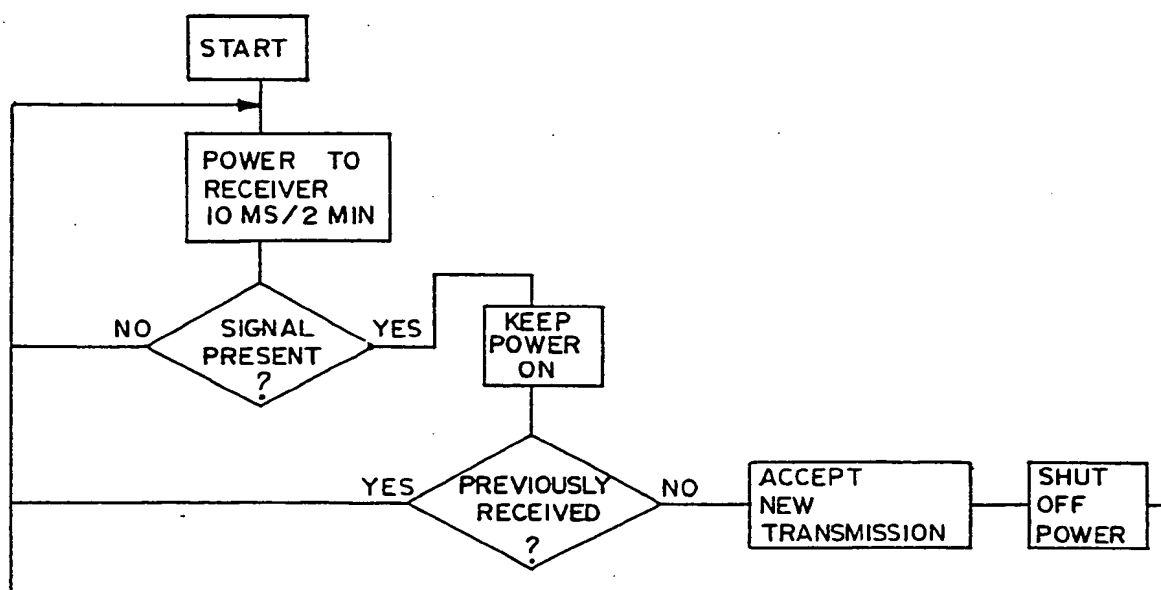


FIG. 8

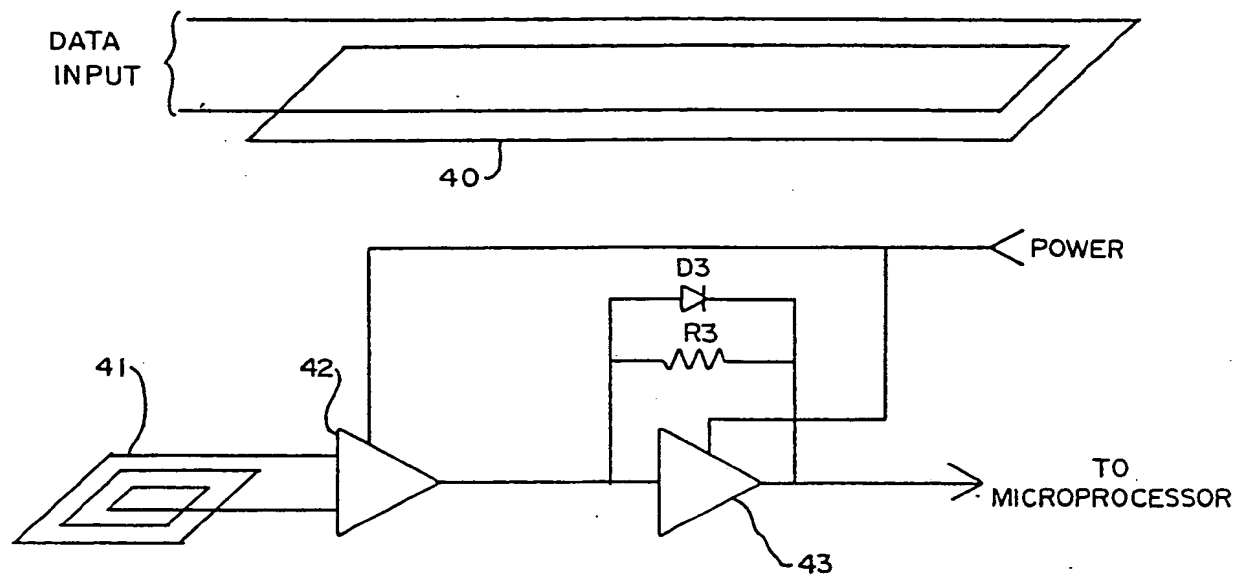


FIG. 9

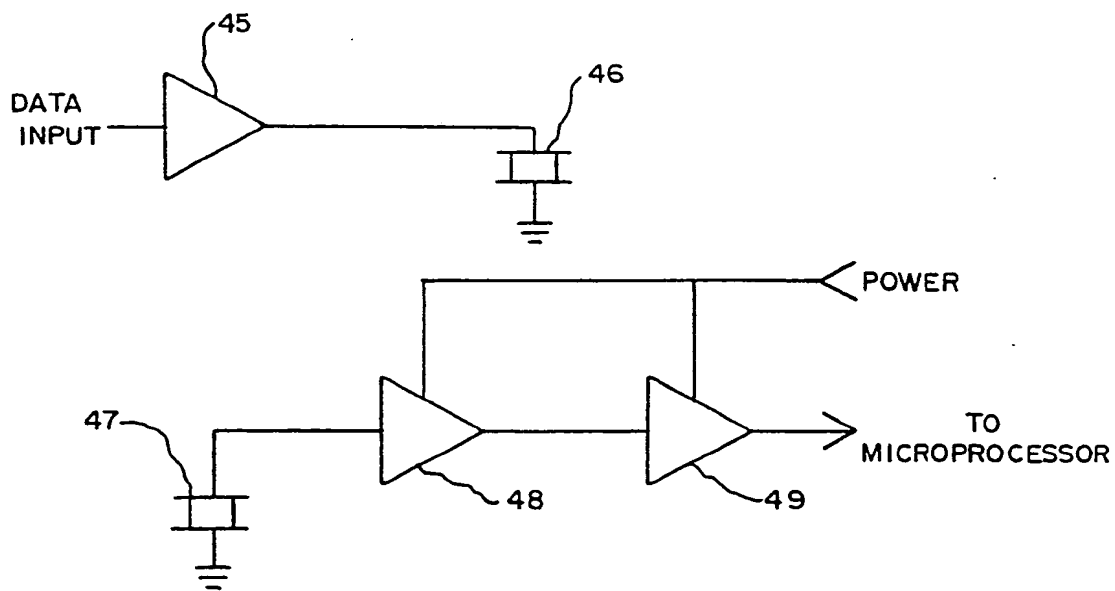


FIG. 10



5/6

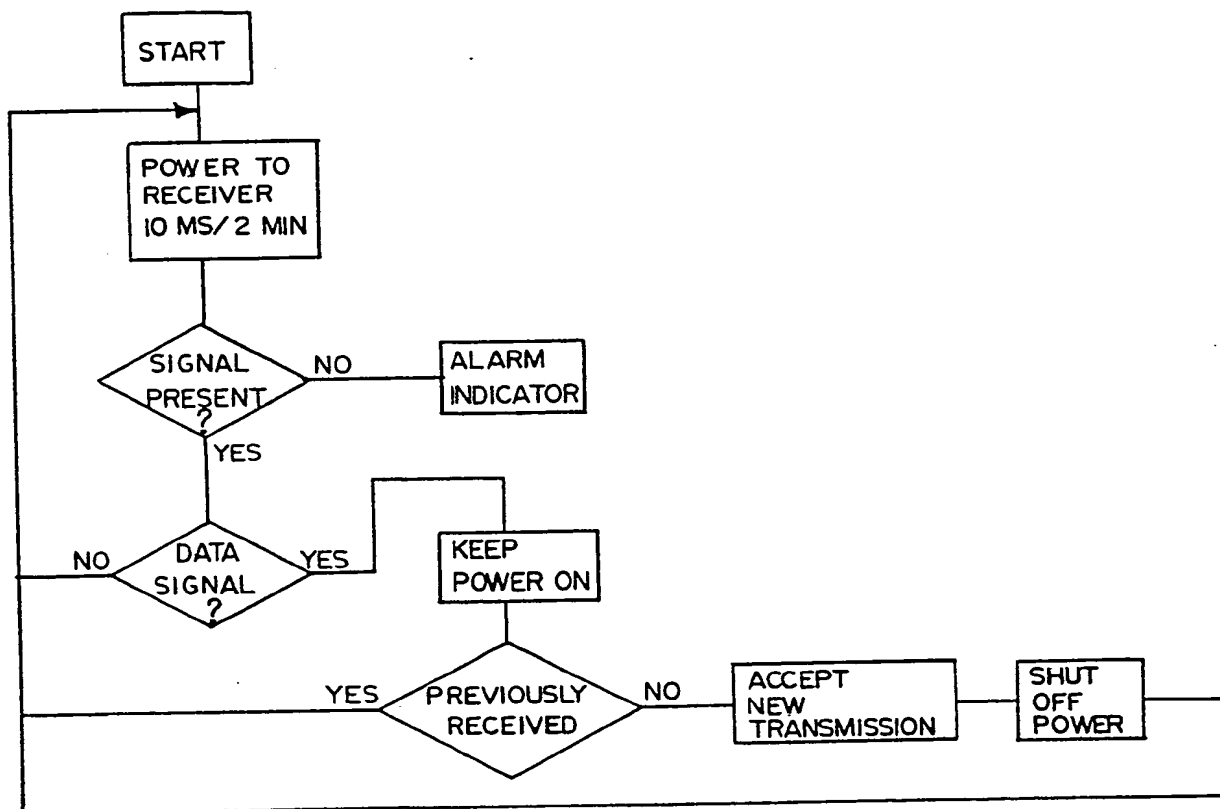


FIG. 11

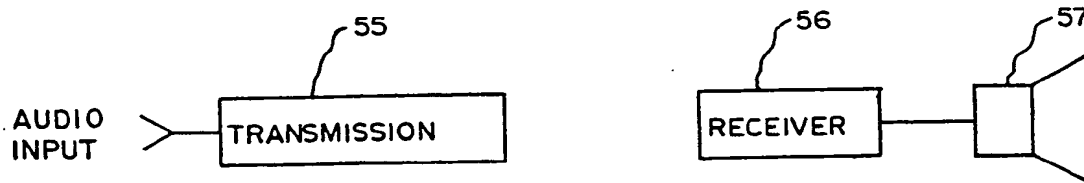


FIG. 12

6/6

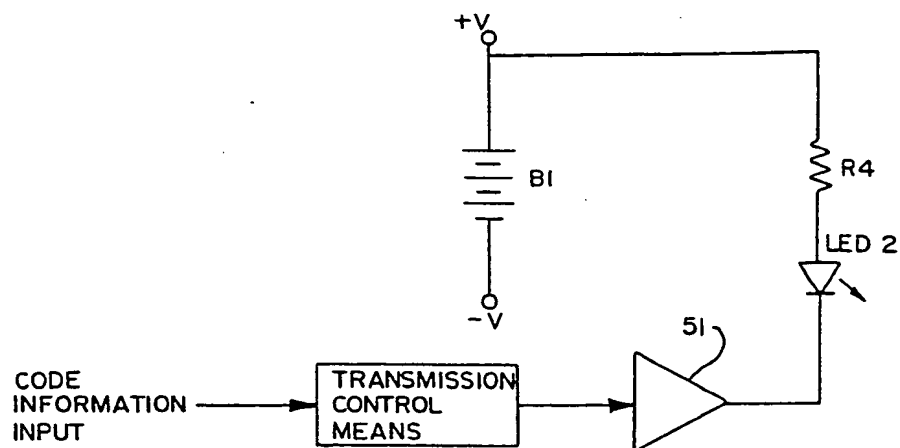


FIG. 13

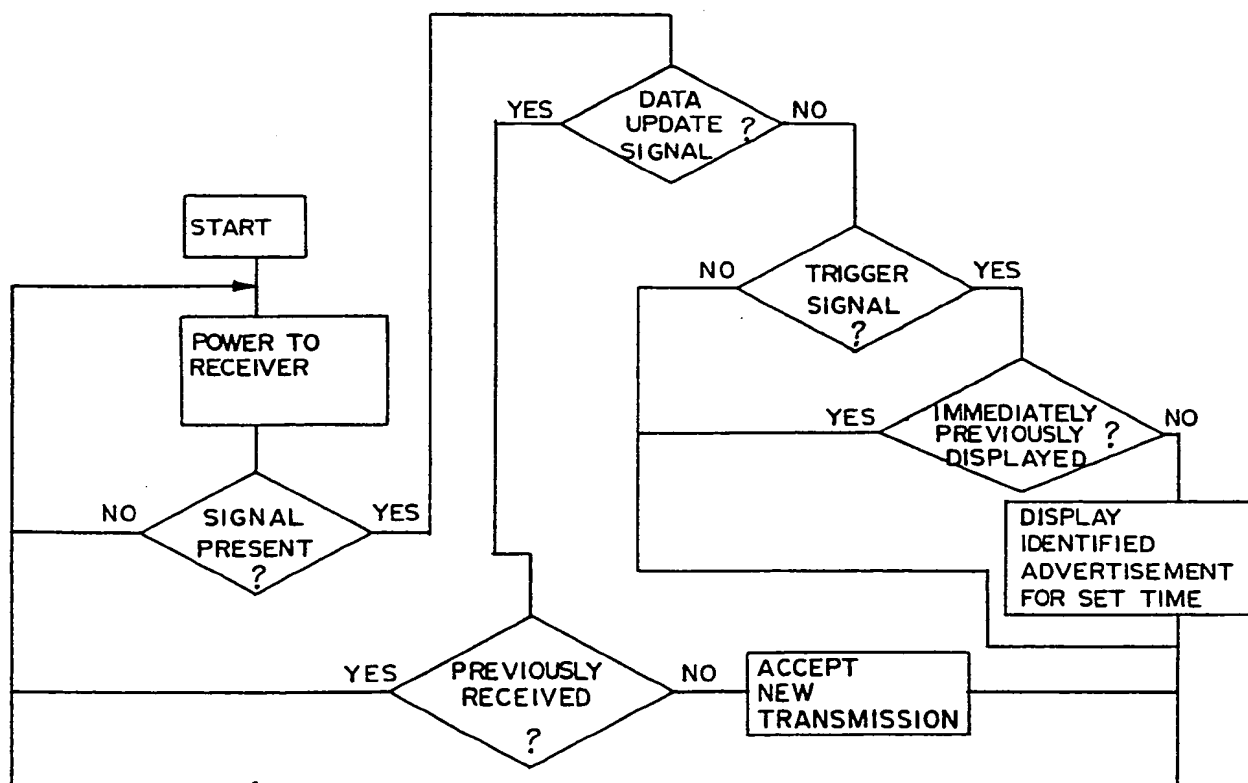


FIG. 14

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US90/07128

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all)		
According to International Patent Classification (IPC) or to both National Classification and IPC IPC(5): G06F 7/04 B62D 39/00 G08B 13/14 G06F 15/20 G06F 15/22 US CL.: 340/825.35 280/33.994 340/571 364/400 364/401		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched *		
Classification System	Classification Symbols	
US	340/825.35, 280/33.994 340/571, 364/400, 364/401	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages **	Relevant to Claim No. **
Y, P X, P	US, A, 4,973,952 (MALEC et al.) 27 November 1990 See entire document.	1-13, 18-22, 25-37 14-17, 23, 24
X	US, A, 4,772,880 (GOLDSTEIN et al.) 20 September See entire document.	23, 24
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: 1°</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other: special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"Δ" document member of the same patent family</p> </div> </div>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search *	Date of Mailing of this International Search Report *	
25 FEBRUARY 1991	24 APR 1991	
International Searching Authority *	Signature of Authorizing Officer **	
ISA/US	 DOON YUE CHOW	